

OVERVIEW OF 2002 RAILROAD EMPLOYEE FATALITIES

EXECUTIVE SUMMARY

This document, entitled “2002 Railroad Employee Fatalities: An Analytical Study,” was developed to promote and enhance awareness of many unsafe behaviors and conditions that typically contribute to railroad employee fatalities. By furthering our understanding of the causes of railroad employee fatalities, this report is intended to assist railroad industry stakeholders in their efforts to prevent similar tragedies.

This document contains the following materials:

- Narrative reports which provide in-depth coverage of 2002's 19 railroad employee fatalities, helping readers to visualize the accident scene and chain of events leading up to the fatalities, and the post-accident investigation process;
- ***Summaries, preceding each narrative report, which highlight important elements of each individual fatality, particularly the possible contributing factors (PCFs).*** This format allows the reader to walk through and analyze each fatality scenario, identifying ways the fatalities could have been prevented. PCFs are expressed as brief narrative statements such as “The Switchman Foreman got off moving equipment, in non-compliance with the railroad’s operating rules.”

The summaries also list Selected Factors which identify where and when the individual fatalities occurred, particulars about the fatally injured parties (i.e. age, years of service, training, and certification where applicable), craft and positions of the other workers, and major activities of fatally injured employees at the time of the incidents;

- ***Overall findings for the 2002 fatalities (see Pages 2-7)*** which identify ***who*** the ***majority*** of fatally injured employees were (i.e. craft, job position, age group, and years of service); ***what*** most were doing at the time of the incidents; ***when*** most were fatally injured (i.e. time of year and time of day); ***where*** most incidents occurred (i.e. type of railroad); and most importantly, ***why*** most fatalities occurred in terms of ***PCFs***; and
- Bar and pie charts (***Appendices A through I***) which illustrate the above findings.

COMPLEXITY OF FATALITIES

Fatalities usually resulted from a chain of events or the errors of more than one individual, as revealed by the PCFs for each fatality. ***In 2002, approximately 84 percent of all fatalities had three or more PCFs. Fatalities ranged in complexity from only one PCF to six PCFs.***

As an example, Report FE-10-02 describes a complex fatal incident in which an Electric Traction Work Crew was removing a sectionalizing switch from a catenary pole when the Lead Maintainer was struck by a passing train, dying two hours later from head trauma. The event involved the following six PCFs:

- In non-compliance with Federal regulations, the employees did not receive a safety briefing, nor did they demonstrate to investigators an understanding of the safety procedures to be used on the night of the incident;
- The Employee-in-Charge (EIC) failed to obtain foul time in the proper manner (by listing track designation, track limits, and time limits requested; repeating the request; and receiving confirmation from the issuing authority before implementing foul time) in non-compliance with Federal regulations;
- The EIC failed to comply with Federal regulations governing radio procedures for ending transmissions;
- Investigators determined that the EIC had not received field training by a supervisor, nor did he demonstrate an understanding of the duties of an EIC;
- The EIC was inexperienced with an important function of an EIC; during his one year in this role, he had obtained foul time only four times; and
- Investigators determined that the railroad's compliance testing program had placed little emphasis on Roadway Worker Protection/On-Track Safety (RWP/OTS).

FINDINGS

WHO were most of the fatally injured employees?

- ***Craft: Transportation and Engine (T&E) Employees***

In 2002, T&E employees represented approximately 42 percent of railroad employee fatalities, Maintenance of Equipment (MOE) employees approximately 37 percent, Maintenance of Way (MOW) employees approximately 16 percent, and Signal and Train Control (S&TC) employees approximately 5 percent of railroad employee fatalities.

(See [Appendix A](#), 3-D pie chart entitled "2002 Railroad Employee Fatalities By Craft.")

- ***Position: Carmen***

In 2002, approximately 32 percent of all fatally injured employees were Carmen, and approximately 16 percent were Conductors. Ranking third, Locomotive Engineers comprised approximately 11 percent of all fatally injured employees. Other fatally injured employees included a Brakeman, High Tension Gang Foreman, Machinist, Overhead Maintainer, Rail Track Grinder Operator, Switchman, System Laborer, and Yard Foreman.

(See [Appendix B](#), stacked bar chart entitled “2002 Railroad Employee Fatalities by Craft and Position.”)

- ***Experience: Very Experienced (21-35 Years of Service)***

Most fatally injured employees in 2002 were very experienced; approximately 47 percent had served 21-35 years. The very inexperienced, who served 0-5 years, and employees with 21-35 years of experience each ranked second at approximately 21 percent of all fatally injured employees.

(See [Appendix C](#), stacked bar chart entitled “2002 Railroad Employee Fatalities: Years of Service by Craft.”)

- ***Age Range: 46-55 Years***

In 2002, approximately 47 percent of all fatally injured employees were concentrated in the 46-55 year range. Employees in the 36-45 year range represented approximately 37 percent of all fatally injured employees. The remaining approximately 16 percent of fatally injured employees were in the 18-35 year range.

(See [Appendix C](#), cluster bar chart entitled “2002 Railroad Employee Fatalities: Age Ranges by Craft.”)

WHAT were most of the fatally injured employees doing when they were fatally injured?

- ***Activity: Switching or Repairing Freight Cars and Locomotives***

In 2002, approximately 26 percent of fatally injured employees were involved in switching, and approximately 21 percent were fatally injured while repairing freight cars and locomotives. Ranking third, employees en route via train comprised 11 percent of all fatally injured employees. Other activities in which employees were fatally injured in 2002 included boarding a standing locomotive, car inspection, traveling en route via highway vehicle, removal of a sectionalizing switch from a catenary pole, repair of a downed power line, repair of a loading ramp, and track maintenance.

(See [Appendix D](#), stacked bar chart entitled “2002 Railroad Employee Fatalities by Craft and Activity.”)

WHERE did most of the railroad employee fatalities occur?

- ***Type of Railroad: Class I Freight Railroads***

In 2002, approximately 68 percent of all railroad employee fatalities occurred on Class I freight railroads, approximately 16 percent on Class II and III railroads, and approximately 16 percent on commuter/passenger railroads. These railroad categories employed approximately 78 percent, approximately 11 percent, and approximately 11 percent of the nation’s total railroad employees, respectively.

(See [Appendix E](#), 3-D bar [cylinder] chart entitled “2002 Railroad Employee Fatalities by Type of Railroad.”)

WHEN did most of the fatalities occur?

- ***Season(s): Spring or Summer***

In 2002, approximately 42 percent of all fatalities occurred in the spring and approximately 26 percent in the summer. In the winter and fall seasons, respectively, approximately 21 percent and 11 percent of railroad employee fatalities occurred.

(See [Appendix F](#), pie chart entitled “2002 Railroad Employee Fatalities by Season of Year.”)

- ***Time of Day: Day by a Small Margin***

Data of the U.S. Naval Observatory, Astronomical Applications Department, provided the precise times for sunrise and sunset for the specific dates and locations of the fatalities. To distinguish fatalities which occurred during daylight from those which occurred during darkness, this analysis employs the definitions of “day” as at sunrise through sunset, and “night” as immediately after sunset until sunrise. In 2002, approximately 53 percent of the fatalities occurred during the day and approximately 47 percent during the night.

(See [Appendix F](#), pie chart entitled “2002 Railroad Employee Fatalities by Time of Day.”)

WHY did most of the fatalities occur?

- ***Major four PCF Categories in descending order:***

Train Operation and Human Factors
Miscellaneous Contributing Factors
Mechanical and Electrical Failures AND Track and Signal Failures

- ***Most PCFs: Train Operation & Human Factors¹***

- In 2002, approximately 58 percent of all PCFs to the 19 fatalities were Train Operation & Human Factors, followed by approximately 38 percent which were Miscellaneous Contributing Factors.²
- In 2002, approximately 3.5 percent of the PCFs involved Mechanical and Electrical Failures (specifically a high/low coupler mismatch and defective wheel true machine) and approximately another 3.5 percent involved Track and Signal Failures (specifically a partially uninsulated downed power line and a missing roadbed).

(See Appendix G, 3-D pie chart entitled “2002 Railroad Employee Fatalities: Major Possible Contributing Factor Categories.”)

Break-down of Train Operation & Human Factors

- ***Of all the Train Operation & Human Factors in 2002, two sub-categories predominated: Miscellaneous Human Factors, Track, at approximately 31 percent, and Miscellaneous Human Factors, Motive Power and Equipment (MP&E) at approximately 21 percent.***

Miscellaneous Human Factors, Track included fouling track or positioning oneself in front of or between rail equipment; failure to obtain foul time in the proper manner; failure to correct milepost limits on forms before starting job; failure to halt train operations for emergency repairs; and failure to maintain track-related structures (culverts).

¹ During 2002, Train Operation & Human Factors included improper use of brakes; employee's physical condition; inappropriate or nonexistent flag and radio signals; human factors, Track; human factors, MP&E; improper speed; errors in the use of switches; and non-compliance with general switching rules.

² Miscellaneous Contributing Factors, in 2002, included poorly prepared employees; environmental conditions; inexperience; highway collisions; and systemic problems, such as inadequate compliance testing.

Miscellaneous Human Factors, MP&E included boarding or exiting a train too close to the adjacent track; improperly blocking rail cars prior to repair; failure to assure proper clearance for movement; and creating and/or failing to correct dangerous work conditions. As an example of creating dangerous work conditions, one of two Carmen was fatally injured by an explosion while trying to repair a freight car's defective cylinder, which one of the Carmen had previously cleaned with a highly flammable substance.

- ***At 12 percent of Train Operation and Human Factors, Flagging and Radio Signals was the next prevalent sub-category.*** This sub-category comprised absence of a blue signal, improper radio communication, and no portable radios provided as required by the job.
- ***Three sub-categories tied at 9 percent each: Improper Use of Brakes (e.g. failure to secure handbrakes); Improper Use of Switches (e.g. improperly lined; radio-controlled switch not locked properly); and Non-compliance with General Switching Rules (e.g. failure to couple).***
- ***The remaining sub-categories, Employee's Physical Condition (e.g. fatigue or impairment due to drugs or alcohol); and Improper Use of Speed represented 6 percent and 3 percent of Train Operation and Human Factors, respectively.***

(See [Appendix H](#), cluster bar chart entitled "2002 Railroad Employee Fatalities: Train Operation & Human Factors Involved.")

Break-down of Miscellaneous Contributing Factors

- ***Two sub-categories predominated: Poorly Prepared Employees at approximately 42 percent and Environmental Conditions at approximately 33 percent of all Miscellaneous Contributing Factors.***

Poorly Prepared Employees included inadequate briefings; failure to provide instructional materials such as manuals, manufacturer's operational instructions, technical bulletins, etc.; inadequate training provided; lack of communication among employees; employees distracted at critical moments; and poor decision-making.

Environmental Conditions included poor visibility because of inadequate artificial light at night; electrical hazard from downed transmission lines; extreme temperature fluctuations negatively affecting track conditions; moving equipment not heard by employees; and visibility obscured by train movements on adjacent tracks.

- *The remaining three sub-categories, Inexperience, Highway Collisions (including seatbelt not worn), and Systemic Problems (specifically inadequate compliance testing of RWP/OTS) comprised approximately 13 percent, approximately 8 percent, and approximately 4 percent of all Miscellaneous Contributing Factors.*

(See [Appendix I](#), cluster bar chart entitled “2002 Railroad Employee Fatalities: Miscellaneous Contributing Factors.”)